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## **WOODCOCK AGE AND SEX DETERMINATION FROM WINGS**

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## WOODCOCK AGE AND SEX DETERMINATION FROM WINGS

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**Abstract:** Age of woodcock (*Philohela minor*) can be accurately determined throughout the year by differences in pattern, color, and wear of secondary feathers. Immature woodcock retain most secondaries during the postjuvinal molt that begins in July or August and ends in October. In contrast, subadults (first-year adults) and older woodcock molt all secondaries during the postnuptial molt beginning in June or July and ending in October. Retention of juvinal secondaries by immatures and molt of these feathers by adults form the basis for age determination. Sex of woodcock can be accurately determined by width of the outer three primaries, which are conspicuously narrower on males.

Two techniques for external age determination of woodcock have been described. Duvall (1955) found pattern and color of body feathers differed with age. However, immatures (flying young) replace body feathers in July or August, thus preventing age determination from these

feathers after the birds are 2-4 months of age. A second method of age determination, described by Sheldon et al. (1958), is based on microscopic examination of the tips of primaries. These feathers are grown later in the summer by adults and consequently show less wear. Primary-

feather wear can be used for age determination until November, at which time primaries of adults also begin to show wear.

This paper describes a method of age determination similar to that discussed by Duvall (1955), except that my technique is based on pattern, color, and wear of secondaries rather than on body feathers. A method of sex determination from width of primary feathers is also described.

These techniques permit external age and sex determination throughout the year and thus facilitate population studies of woodcock. The methods have considerable management significance because they make it possible to determine age and sex of birds captured for banding, as well as age and sex indicated by wings obtained from hunters.

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#### MATERIALS STUDIED

Wings from 100 woodcock were used to develop the age-determination technique. Eighty-seven birds were collected in October; 13 were shot in November.

Age of October-shot birds was determined by presence or absence of the bursa of Fabricius. Woodcock lacking a bursa were considered adults. This was verified in females by examining the ovi-

duct, which is wider in adults than in young birds that have not nested (Greeley 1953). Age of woodcock in November cannot always be determined by presence or absence of the bursa because some immatures resorb it during the month. Therefore, age of females lacking a bursa in November was determined by width of the oviduct. Males collected in November were considered of known age only if a bursa was present, since males lacking a bursa may have been either immature or adult.

Wings were obtained from 67 woodcock taken in Louisiana from January through April. Resorption of the bursa and active development of the reproductive system prevented conclusive internal age determination of most specimens. Wings from these birds were used to help establish the length of time that age could be determined by means of the technique described in this paper.

Reliability of age and sex classification from wings was determined from 227 woodcock collected in Michigan in late September and early October, when age could be verified internally by presence or absence of the bursa.

#### AGE DETERMINATION

Pettingill (1930) found that woodcock have 16 secondaries, the innermost 3 being considerably shortened and graduated. He believed that immature woodcock replaced only five or six of the secondaries nearest the body during their first summer, but that adults molted all secondaries.

Results of my study, based on known-age specimens and external examination of more than 300 woodcock captured during the summer, support Pettingill's conclusion. All secondaries are replaced by adults during the postnuptial molt that begins in

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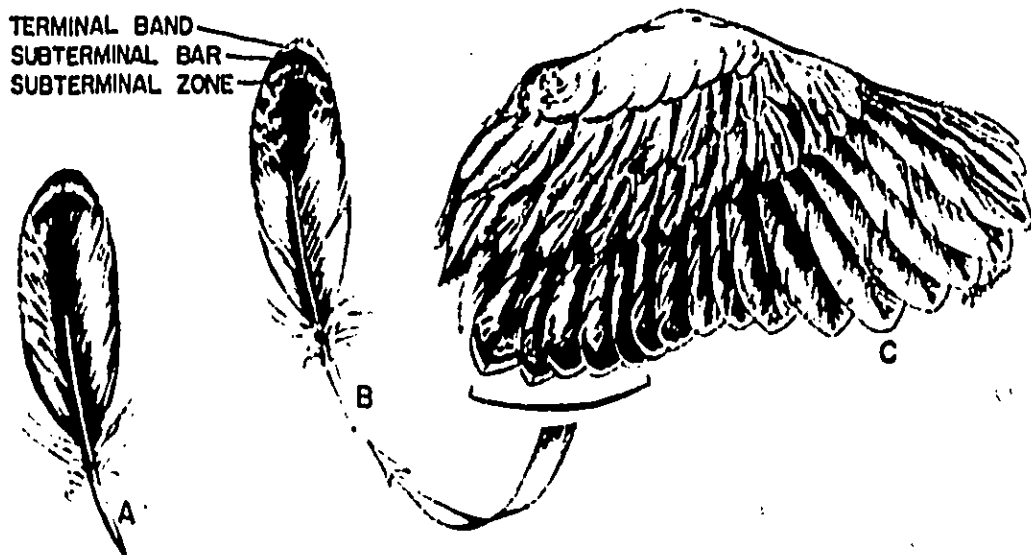


Fig. 1. Ventral view of woodcock wing and secondaries. A. Adult secondary. B. Juvenal secondary. C. Wing of immature. Note light colored terminal band and dark subterminal bar present on juvenal secondary but absent on adult.

June or July and ends in September or October. In contrast, only four to six secondaries next to the body are replaced by immatures during the postjuvinal molt beginning in July or August and ending in October. Retention of juvenal secondaries by immatures and molt of these feathers by adults form the basis for age determination from secondaries.

The color-pattern differences that distinguish adult from immature wings are shown in Fig. 1 and are described in detail below. I made my determinations from the underside of the secondaries because differences in pattern and color were more apparent to me from this view.

Table 1 shows the frequency of occurrence of juvenal feather characters on secondaries of 58 immature woodcock collected in October and November. These characters were absent on wings of 42 adults collected in the same months. Table 1 also shows frequency of juvenal-feather characters on wings of 39 wood-

cock collected from January through April and judged from secondary feathers as having hatched in the preceding calendar year (subadults).

#### Immatures

Several secondaries adjacent to the body are edged around the tip with a light-colored band (terminal band) that usually contrasts greatly with the remaining darker portion of the feather.

The light-colored terminal band is joined proximally by a well-defined bar (subterminal bar) that is darker or denser than the rest of the feather. In doubtful cases, the presence or absence of this bar is made more apparent by stroking or compressing the feather. The outer (distal) side of the dark bar usually is pointed at the midrib and forms a smooth border with the lighter-colored terminal band. The inner (proximal) side of the dark bar is less

Table 1. Occurrence of age determination characters on secondaries of "immature" woodcock. Incidence of characters on adult wings is not shown because all lacked an immature character.

CHARACTERS	Collected			
	Oct. and Nov.* (58 birds)		Jan. through April (39 birds)	
	Present	Absent or Indecisive	Present	Absent or Indecisive
1. Light-colored terminal band at tip of one or more secondaries contrasting strongly with remainder of feather	52	0	24	15
2. Light-colored band at tip of feather followed proximally by well-defined dark subterminal bar forming smooth border with light terminal band	58	0	39	0
3. Proximal edge of subterminal bar generally well defined and even	58	0	39	0
4. Subterminal bar regular on distal edge and pointed at midrib	58	0	30	3
5. Subterminal bar distinctly darker or denser than any other portion of feather	55	3	30	3

\* Age determined internally.

† Age determined internally for four birds; age of remaining birds judged by secondaries.

regular but still is distinct from the area below it (subterminal zone).

#### Adults

The ventral surface of the secondaries lacks a contrasting light-colored band around the tip.

A well-defined subterminal dark bar is absent. If the dark bar appears to be present, there is an uneven or poorly defined border between it and the light-colored terminal band. The border between the dark bar and the subterminal zone proximal to it is irregular and indistinct.

#### Identification of Age-Classes

There are three distinctly different periods in the year in regard to determining age of woodcock from wings.

During the first period, January 1 until April (or until flying young appear), two age-classes can be recognized by presence or absence of juvenal secondaries: sub-

adults (birds hatched in the preceding calendar year that have retained juvenal secondaries) and adults (birds hatched earlier than the preceding year).

From April through September, three age-classes can be recognized: adults, subadults, and immatures (flying young). The greatest chance of error in age determination will occur during this period, for subadults could be incorrectly classified as immatures because of presence of juvenal secondaries. Immatures may be distinguished from subadults in the following manner: Most subadults and adults begin molting primaries and secondaries in July. Woodcock molting primaries or secondaries cannot be immatures because immatures do not molt these feathers (except for the innermost secondaries). Birds molting primaries or secondaries are either subadults or adults. Their age can be determined by presence or absence of juvenal secondaries (present on subadults). Subadults that have not begun molting can

be separated from adults on the basis of condition of their juvenal secondaries. On subadults, these feathers are carried for more than one season and are faded and frayed. On adults, the feathers show little wear and are replaced each summer.

During the second period, October through December, only two age-classes can be recognized: adults and subadults. Adults have replaced all their feathers with adult feathers. Subadults have replaced all their feathers with adult feathers. Thus, the adult and subadults and old

#### Accuracy of Age Determination

High accuracy can be achieved from secondaries of known-age winged birds. The Key to Woodcock Wings (page 292) is a guide. Unless feathers are in poor condition, the sequence are usually high even with the method learned. a key is used in age determination only 1 percent for woodcock collected September 29 the Trained biologist other wings with

#### SEX DETERMINATION

Several methods which enable sex to be determined by examining the wings. In order to assess

be separated from immatures by the condition of their juvenal feathers. On the subadult, these feathers will have been carried for more than 1 year and will be faded and frayed. Secondaries of immatures show little wear or fading in the summer.

During the final period, October through December, usually only immatures and adults can be recognized. Most subadults have replaced their juvenal secondaries with adult feathers by October 1. Thus, the adult category includes both subadults and older birds.

#### **Accuracy of Age Determination**

High accuracy in age determination from secondaries requires study of a known-age wing collection for several days. The Key to Age of Woodcock from Wings (page 292) is intended only as a guide. Unless feather characters and molt sequence are understood, error will be high even with the use of the key, whereas, once the method of age determination is learned, a key is not necessary. My error in age determination from secondaries was only 1 percent for 227 internally examined woodcock collected in Michigan from September 29 through October 8, 1963. Trained biologists determined age from other wings with only a 2-percent error.

#### **SEX DETERMINATION**

Several methods have been developed which enable sex of woodcock to be determined by examination of external features. In order to assemble the methodology of

sex and age determination, a brief review of technique for sex determination follows.

Mendall and Aldous (1943:14) found that wings of females often were longer than those of males. Ninety-five percent of the birds with wings more than 138 mm long (measured from bend of the wing to the tip of the longest straightened primary) were females; almost all birds with wings 125 mm or less were males. Sex cannot be determined reliably for the many wings that range between these two measurements.

Greeley (1953:29) noted that the outer three primaries (numbers 8 through 10) were wider in females than in males. Refining Greeley's method, Blankenship (1957:89) determined that if combined width of the outer three primaries (unflattened feathers measured 2 cm from the tip) was 12.4 mm or less, the wing was from a male; if combined width was 12.6 mm or more, it was from a female.

In rare instances, when combined width is 12.5 mm or when primaries are missing, sex can be determined by bill length (inner edge of the nares to tip of bill). Nearly all bills 61 mm or less are from males; bills 65 mm or longer are from females (Blankenship 1957). Since sex cannot be determined from the many bills that range between these two values, primaries should be used when possible. With practice, feather measurements usually are not necessary because male primaries are conspicuously narrower. I made accurate sex determination from outer primaries of all 227 woodcock collected in Michigan in 1963.

## KEY TO AGE OF WOODCOCK FROM WINGS

January through March (when immatures are not present in the population)

- I. Terminal light-colored band present on underside of tip of two or more secondaries:<sup>1</sup>
  - A. Band contrasts greatly with rest of feather . . . . . Subadult (first-year adult)
  - B. Band not contrasting greatly with rest of feather:
    1. Subterminal dark bar bordering light-colored terminal band:
      - (a) Bar well defined; pointed at midrib and forms generally smooth border with lighter-colored terminal band; darker or denser than rest of feather . . . . . Subadult (first-year adult)
      - (b) Bar poorly defined; if discerned, distal edge forms uneven or poorly outlined border with lighter-colored terminal band . . . . . Adult (older than 1 year)
    2. Subterminal dark bar absent . . . . . Adult (older than 1 year)

April through December (when immatures are present in the population)

- I. Primary feathers not molting and primaries and secondaries not noticeably faded and worn:
  - A. Terminal light-colored band present on underside of tip of two or more secondaries:<sup>1</sup>
    1. Band contrasts greatly with rest of feather . . . . . Immature
    2. Band not contrasting greatly with rest of feather:
      - (a) Subterminal dark bar bordering light-colored terminal band:
        - (1) Bar well defined; pointed at midrib and forms generally smooth border with lighter-colored terminal band; darker or denser than rest of feather . . . . . Immature
        - (2) Bar poorly defined; if discerned, distal edge forms uneven or poorly outlined border with lighter-colored terminal band . . . . . Adult (Sept.-Dec.)
      - (b) Subterminal dark bar absent . . . . . Adult (Sept.-Dec.)
    - B. Terminal light-colored band absent . . . . . Adult (Sept.-Dec.)
  - II. Primary feathers molting or primaries and secondaries much faded and worn:
    - A. Terminal light-colored band present on underside of tip of two or more secondaries:<sup>1</sup>
      1. Band contrasts greatly with rest of feather . . . . . Subadult (first-year adult)
      2. Band not contrasting greatly with rest of feather:
        - (a) Subterminal dark bar bordering light-colored terminal band:
          - (1) Bar well defined; pointed at midrib and forms generally smooth border with lighter-colored terminal band; darker or denser than rest of feather . . . . . Subadult (first-year adult)
          - (2) Bar poorly defined; if discerned, distal edge forms uneven or poorly outlined border with lighter-colored terminal band . . . . . Adult (older than 1 year)
        - (b) Subterminal dark bar absent . . . . . Adult (older than 1 year)
      - B. Terminal light-colored band absent . . . . . Adult (older than 1 year)

<sup>1</sup>When examining secondaries for presence of terminal band and subterminal bar, omit the four to six distinctly barred secondaries nearest the body and examine underside of tip of the next five feathers.

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